Architecting System Performance; Defining Performance

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Abstract

Performance is a broad term. Each domain has its own key performance parameters. Performance can be used to indicate time-oriented performance, such as response time, throughput, or productivity. However, more broadly, it may be used for aspects like image quality, spatial performance (f.i. positioning accuracy), energy or power properties, sensitivity and specificity of algorithms, or reliability and availability.

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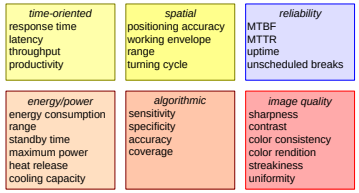


Performance Attributes

time-oriented
response time
latency
throughput
productivity

spatial
positioning accuracy
working envelope
range
turning cycle

reliability
MTBF
MTTR
uptime
unscheduled breaks

energy/power
energy consumption
range
standby time
maximum power
heat release
cooling capacity

algorithmic
sensitivity
specificity
accuracy
coverage

image quality
sharpness
contrast
color consistency
color rendition
streakiness
uniformity

Defining Performance

performance is a function of:

- context
  - perception — depends on individual human characteristics
  - circumstances, operation of interest — scenario, use case[1]
- system of interest
  - specification, design — generic, valid for the class of systems; normal and special cases (worst case, degraded, exceptions, …)
  - configuration, version, history — instance specific

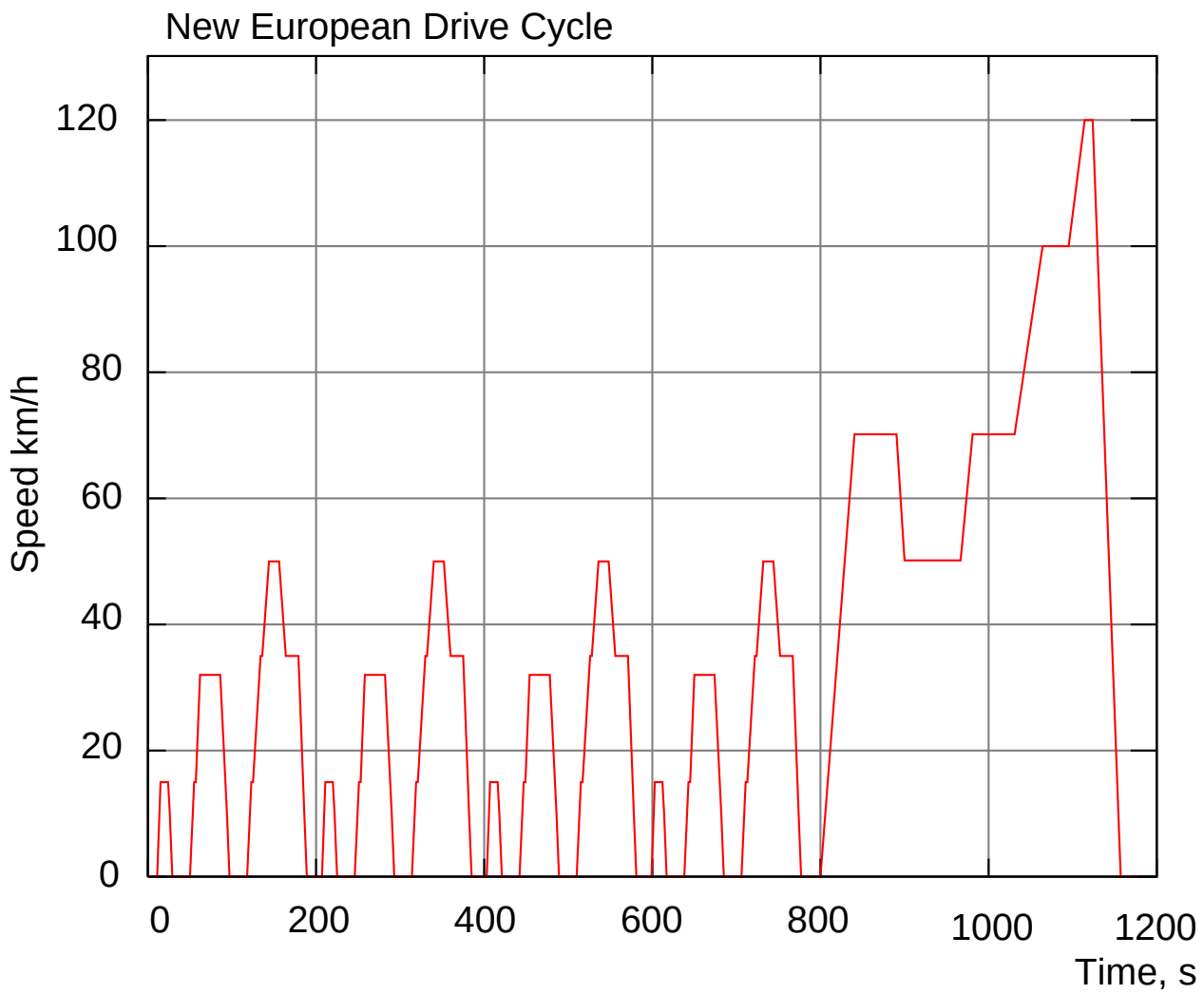
[1] a use case in this context is rich (includes quantifications) and broad (covers the operation of interest, not a single function)

Example EV Range Definition

Electric Vehicle
Driving Range

Range = f(
v(t),
Circumstances,
Driving style,
Car load,
Charging state,
Battery age)

A quantified Use Case defines under what circumstances the EV will achieve the specified range.



http://en.wikipedia.org/wiki/New_European_Driving_Cycle#/media/File:New_European_Driving_Cycle.svg
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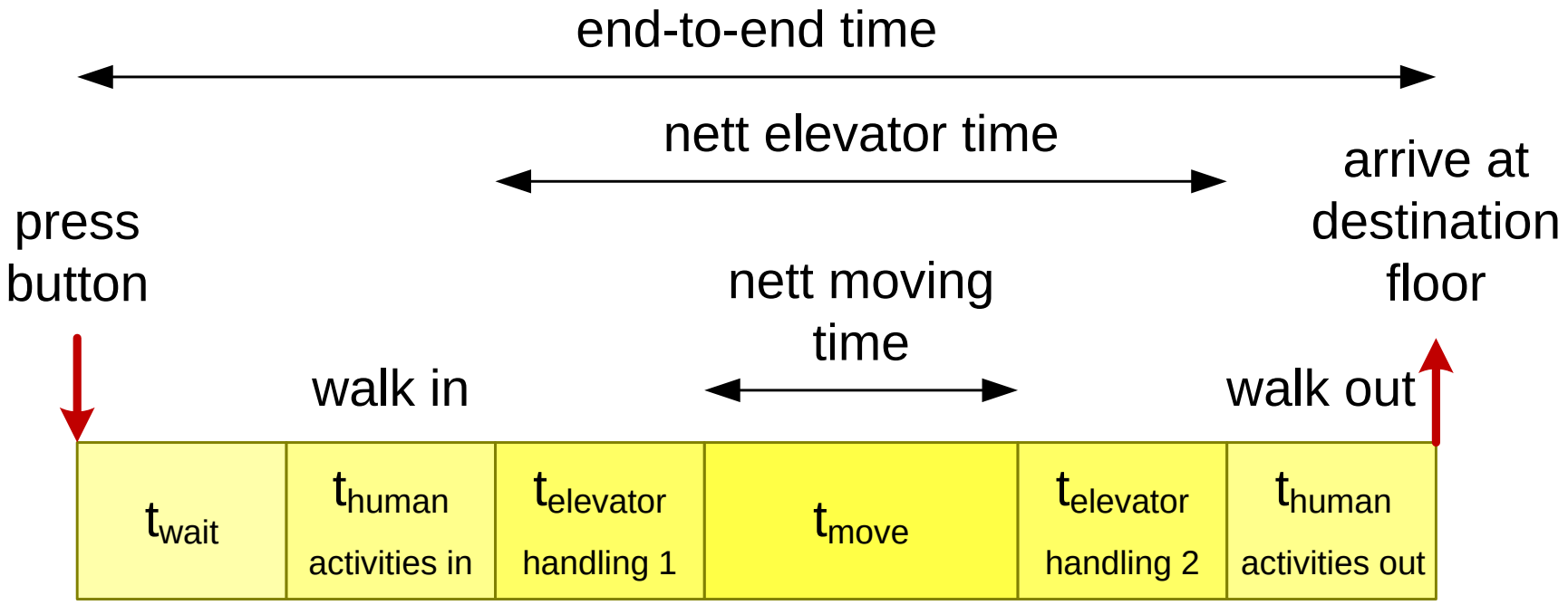
End-to-End Performance

The **end-to-end** performance is the relevant performance as the **stakeholder** experiences it: from **initial trigger** to **final result**.



$$t_{end\text{-}to\text{-}end} = t_{human\ activities} + t_{wait} + t_{elevator\ handling} + t_{move}$$